IN THE CLAIMS

Please amend the claims as follows:

1-11. (Canceled)

12. (Currently Amended) Two-dimensional detector of incident ionizing radiation composed of first particles, comprising:

a stack of sheets of a first material configured to emit second particles by interaction with the incident ionizing radiation;

layers of a semiconducting material that alternate with the sheets of the first material and that ~~may~~ are able to be ionized by the second particles, each of the layers being associated with one of the sheets, the stack having opposite first and second faces each including corresponding edges of the sheets and layers, the detector configured to be laid out such that the ionizing radiation arrives on the first face, a length of each sheet measured from the first face as far as the second face being equal to at least one tenth of a free average path of the first particles in the first material;

groups of parallel and electrically conducting tracks extending from the first face to the second face parallel to the layers, each group being associated with one of the layers and in contact with ~~an associated layer~~ said one of the layers, the tracks being designed to collect charge carriers that are generated in the layers by interaction of the layers with at least one of the second particles and the first particles and that are representative of the first particles in intensity and in position; and

means for creating an electric field capable of causing collection of charge carriers through the tracks,

wherein said first material is a different material than a material used to form the

layers of semiconducting material.

13. (Previously Added) Detector according to claim 12, wherein the first material is electrically conducting, the tracks are electrically insulated from the sheets, and the means for creating the electric field comprises means for applying a voltage between the tracks and the sheets, this voltage able to cause the collection of charge carriers through the tracks.

14. (Currently Amended) Detector according to claim 12, wherein each group of tracks is ~~fully located~~ contained within the layer with which it is associated.

15. (Previously Added) Detector according to claim 14, wherein the first material is electrically conducting and the means for creating the electric field comprises means for applying a voltage between the tracks and the sheets, this voltage able to cause the collection of charge carriers through the tracks.

16. (Previously Added) Detector according to claim 12, wherein the sheets are electrically insulating, an electrically conducting layer is inserted between each layer of semiconducting material and the sheet that is associated with it, and the means for creating the electric field comprises means for applying a voltage between the tracks and the electrically conducting layers, this voltage able to cause the collection of charge carriers through the tracks.

17. (Currently Amended) Detector according to claim 12, wherein the semiconducting material is selected from the group consisting of thin layers of diamond, CdTe, ZnTe, CdZnTe, AsGa and ~~their~~ its alloys, InP, InSb, SiC, crystalline silicon, amorphous silicon, organic crystals, amorphous selenium, and chalcogenic glass (As_2S_3).

18. (Previously Added) Detector according to claim 12, further comprising an electronic device configured to read electrical signals output by tracks when the tracks collect

charge carriers.

19. (Currently Amended) Detector according to claim 18, wherein one end of each track is curved to extend onto an edge of the corresponding layer of semiconducting material, this edge being located on the second face of the stack, and ~~further comprising~~ said device comprises electrically conducting pads that are respectively in contact with the ~~corresponding~~ curved ends of the tracks.

20. (Currently Amended) Process for manufacturing the detector according to claim 12, wherein a layer of semiconducting material is formed on each sheet, this layer being provided with the group of tracks associated with it, and the sheets provided with layers of semiconducting material and tracks are assembled together to obtain ~~a~~ the stack in which these layers of semiconducting material alternate with the sheets.

21. (Currently Amended) Process according to claim 20, wherein a first layer of semiconducting material is formed on each sheet, a thickness of said first layer of semiconducting material being less than a thickness of ~~the~~ said layer of semiconducting material, the group of tracks is formed on this first layer and a second layer of semiconducting material that covers these tracks is formed on the first layer, a total thickness of the first and second layers being equal to the thickness of ~~the~~ said layer of semiconducting material.

22. (Currently Amended) Process for manufacturing the detector according to claim 12, wherein a half layer of semiconducting material is deposited on two opposite faces of two successive sheets, and then the group of tracks is formed on one of the half layers and the sheets thus covered are assembled together to create ~~a~~ the stack in which the layers alternate with the sheets.